NON-PUBLIC?: N
ACCESSION #: 9410040141
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Edwin I. Hatch Nuclear Plant - Unit 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000366

TITLE: RPS Control Switch Overtravel Results in an Automatic
Reactor Shutdown
EVENT DATE: 08/30/94 LER #: 94-007-00 REPORT DATE: 09/23/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Steven B. Tipps, Nuclear Safety & Compliance Manager
TELEPHONE: (912) 367-7851

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 8/30/94, at 1007 EDT, Unit 2 was in the Run mode at 2436 CMWT (100 percent rated thermal power). At that time, the power supply for Reactor Protection System (RPS) bus "A" was being transferred from the alternate to the normal power supply when a full RPS actuation occurred along with a Group 1, 2, and 5 Primary Containment Isolation System (PCIS) actuation. As a result, all control rods fully inserted and various PCIS valves automatically closed. Immediately following the RPS actuation, the reactor water level began decreasing as expected. The lowest level reached during the level transient was approximately 43 inches below instrument zero (approximately 115 inches above the top of the active fuel). As the reactor water level decreased to the appropriate setpoints, the following engineered safety features initiated: High Pressure Coolant Injection System (HPCI), Reactor Core Isolation Cooling System (RCIC), Standby Gas Treatment System (SGT), and

the Recirculation Pump Trip System (RPT). All systems functioned as designed. Reactor water level was restored by the Reactor Feedwater Pumps (RFP) and RCIC. The highest reactor pressure reached during the event was 1092 psig. Eight Safety Relief Valves opened to reduce pressure. The SRVs subsequently closed at the appropriate pressures as the pressure decreased. The cause of the event was a slight overtravel of the RPS power select switch. An intolerance for overtravel of the switch positions resulted in a momentary loss of power to both RPS busses and the consequent actuations. Corrective actions include replacing the switch, installing a warning placard, and considering a design change.

END OF ABSTRACT

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor
Energy Industry Identification System Codes are identified in the text as (EIIS Code XX).

DESCRIPTION OF EVENT

On 8/30/94, at 1007 EDT, Unit 2 was in the Run mode at 2436 CMWT (100 percent rated thermal power). Prior to this time, preparations for transferring the power supply of Reactor Protection System (RPS, EIIS Code JC) bus "A" from the alternate supply (600 V bus 2C) to the normal supply (RPS Motor-Generator (MG) set "A") were being made. The transfer is a "break-before-make" transfer and would result in the inboard Reactor Water Cleanup (RWCU, EIIS Code CE) System Group 5 Primary Containment Isolation System (PCIS, EIIS Code JM) valve (2G31-F001) automatically closing and the RWCU pump automatically shutting down. It is undesirable from an operations standpoint for the RWCU system to be isolated during plant operation. Also, the transfer activity takes only several minutes to accomplish. Therefore, plant procedures allow deactivation of the valve breaker with the valve in the open position during the transfer to prevent isolation of the RWCU system. Consequently, at approximately 1005 EDT, the valve breaker was opened. In accordance with the Technical Specifications, the limiting condition for operation with a deactivated and open PCIS valve was entered. At 1007 EDT, the RPS bus power supply transfer switch was taken from the alternate "A" position to the normal position to effect the transfer when a full RPS actuation occurred along with a Group 1, a Group 2, and a Group 5 PCIS actuation. As a result, all control rods fully inserted, the inboard and outboard Main Steam Isolation Valves (MSIVs)

automatically closed, the outboard Reactor Water Cleanup isolation valve 2G31-F004 automatically closed isolating the Primary Containment (EIIS Code NH) penetration serving the RWCU system, and the applicable Group 2 PCIS valves automatically closed. Additionally, the Main Control Room Environmental Control System (MCRECS, EIIS Code VI) automatically transferred to the pressurization mode (This was an expected result from the power supply transfer.). Within three minutes of the actuations occurring, the breaker for the inboard RWCU - PCIS valve (2G31-F001) which had earlier been opened was closed, resulting in automatic closure of the valve.

Immediately following the RPS actuation, the reactor water level began decreasing due to void collapse in the reactor vessel. As the reactor water level reached approximately 2.3 inches above instrument zero, as designed, Group 2 PCIS and RPS actuation signals were generated again, this time on low reactor water level. All of the applicable Group 2 PCIS valves had already closed and the RPS logic had already been tripped, thus, the additional actuation signals had no effect on the plant. As reactor water level decreased to approximately 28 inches below instrument zero, the following engineered safety features initiated as designed: High Pressure Coolant Injection System

(HPCI, EIIS Code BJ), Reactor Core Isolation Cooling System (RCIC, EIIS Code BN), Standby Gas Treatment System (SGT, EIIS Code BH), and the Recirculation Pump Trip System (RPT, EIIS Code AD).

The SGT system started and the required vacuum was established in Secondary Containment (EIIS Code NG). The Recirculation pumps automatically shutdown as required. The Reactor Feedwater Pumps (RFP, EIIS Code SJ) responding to the decrease in reactor water level, restored level to above the HPCI/RCIC initiation setpoints before HPCI and RCIC could automatically inject into the reactor vessel. Consequently, HPCI ran on minimum flow until it later tripped on high reactor water level. The RCIC discharge valve was manually opened by one of the licensed operators responding to the transient and, thus, provided make-up to the reactor vessel.

The lowest level reached during the transient was approximately 43 inches below instrument zero (approximately 115 inches above the top of the active fuel). As water level began increasing rapidly due to operation of the RFPs and RCIC, the "B" RFP was manually secured. At approximately 1008 EDT, the reactor water level reached approximately 51 inches above instrument zero, at which time RCIC and HPCI automatically shutdown on high reactor water level. A few seconds later, the "A" RFP

automatically shutdown on high reactor water level when level reached approximately 54 inches above instrument zero. Level was subsequently controlled via manual operation of the HPCI and RCIC systems.

Reactor pressure decreased as a result of the automatic reactor shutdown; however, due to a high decay heat load in the reactor vessel and the main steam lines being isolated, reactor pressure soon began increasing. At approximately 1009 EDT, reactor pressure reached 1092 psig. In response to the pressure increase, eight Safety Relief Valves (SRVS, EHS Code SB) opened. At that time, the Low-Low Set System (LLS) logic was armed. At 1010 EDT, the reactor pressure had decreased to approximately 850 psig and the SRVs had closed. Subsequently, reactor pressure was controlled using the RCIC and HPCI steam turbines and SRV "B" in the LLS mode of operation

CAUSE OF EVENT

The cause of this event was a slight overtravel of the RPS power select control switch. The design of the switch is such that slight movement of the control switch handle to either side of the vertical "Norm" position could result in the normal power supply for the associated bus being disconnected from the bus. In other words, as the switch is being moved out of the "Norm"

position detent, switch contacts controlling the normal power supply to the bus actually change states, as opposed to the contacts changing states only after the adjacent position detent is reached. In this event, the licensed operator moved the switch from the left-hand or "Alt A" position to the vertical or "Norm" position. This action as expected resulted in a momentary loss of power to the "B" RPS bus. The Division 1 actuation logics powered by this bus thus initiated Division 1 actuation signals to the associated systems. As the switch was taken to the "Norm" position, the operator moved the switch slightly past the vertical position, however, not out of the "Norm" position detent, then released the switch. Due to the switch design, this action caused a momentary loss of power to the "B" RPS bus. The Division 2 actuation logics powered by the "B" RPS bus thus initiated Division 2 actuation signals to the associated systems. These Division I and Division 2 actuation signals resulted in a full RPS actuation along with other engineered safety feature actuations.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is required pursuant to 10 CFR 50.73(a)(2)(iv) in that an event resulted in the unplanned automatic actuation of several engineered safety features. In particular, when RPS bus "A" was being transferred from the alternate to the normal power supply, an RPS actuation occurred along with an actuation of Groups 1, 2, and 5 of PCIS. The consequent reactor water level and pressure transients resulted in actuations of the SGT, HPCI, Low Low Set, and RPT systems.

RPS provides timely protection against events that could potentially result in damage to the fuel by initiating an automatic shutdown of the reactor whenever the appropriate plant parameters exceed design limits. PCIS provides automatic isolation capability of Primary Containment penetrations to preclude the release of radioactive material and the loss of reactor coolant inventory in the unlikely event of an accident. MCRECS is designed to maintain a habitable environment in the Main Control Room for personnel by, in part, pressurizing the Main Control Room with radiologically clean air. Each of these systems is of a fail-safe design in that upon loss of power to one or, in some cases, both divisions of their associated actuation logic, the systems actuate. The RPS busses provide power distribution for the actuation logics of these systems.

In this event, when both RPS busses were momentarily deenergized, the systems actuation logics for RPS, Groups 1, 2, and 5 PCIS, and MCRECS actuated. The actuations resulted in an automatic reactor shutdown, automatic closure of Groups 1, 2, and 5 PCIS valves, and in the automatic transfer of MCRECS to the pressurization mode. As designed, the RPS actuation initiated a rapid insertion of the control rods. The instantaneous reduction in heat generation resulted in the voids in the reactor

vessel collapsing. The void collapse further resulted in a rapid decrease in the reactor water level. As reactor water level decreased to the Level-3 and Level-2 setpoints, the required engineering safety features actuated. Specifically, at approximately 2.3 inches above instrument zero, a second Group 2 PCIS actuation and RPS actuation occurred. Since the Group 2 PCIS valves and the control rods had already received actuation signals, these signals had no effect on the plant.

At approximately 28 inches below instrument zero, as designed, SGT, RCIC, HPCI, and the RPT systems initiated. As a result, SGT started and the required vacuum was established in Secondary Containment. The Recirculation pumps automatically shutdown. RCIC started, however, the

RCIC discharge valve was manually opened by a licensed operator before the valve had received an open signal. Also, before the HPCI discharge valve had received an open signal, the reactor water level had increased to a level above the initiation setpoint for HPCI. Consequently, the HPCI discharge valve was not required to open and HPCI ran on minimum flow until it later tripped on high reactor water level.

Reactor water level was restored by the RFPs and RCIC. Even though closure of the MSIVs isolated the high pressure steam supply to the RFP turbines, ample steam supply was available in the Moisture Separator Reheaters to operate the RFP turbines on low pressure steam until level was restored. As reactor water level began increasing rapidly, a licensed operator secured RFP "B" to slow the increase. Subsequently, when level reached the respective setpoints, RCIC, HPCI, and RFP "A" automatically shutdown to preclude water intrusion into the main steam lines. Reactor water level was then controlled by the manual operation of HPCI and RCIC.

The lowest level reached during the event was 43 inches below instrument zero (115 inches above the top of the active fuel). Consequently, more than adequate cooling of the reactor core was maintained throughout the event.

With closure of the MSIVs as a result of the Group 1 PCIS actuation, reactor pressure began increasing soon after the automatic reactor shutdown. Reactor pressure reached approximately 1092 psig. In response to the pressure increase, eight SRVs opened. The LLS logic was armed at this time. By the time pressure had decreased to approximately 850 psig, the eight SRVs had reclosed. Reactor pressure was then controlled by SRV "B" operating in the LLS mode and by operation of RCIC and HPCI. The highest pressure reached during the event was 1092 psig which is well below

the reactor vessel design limit of 1250 psig. Consequently, the reactor coolant pressure boundary was not jeopardized during the event.

Based on the above information, it is concluded that this event had no adverse impact on nuclear safety. This assessment applies to all operating conditions.

CORRECTIVE ACTIONS

The RPS power select control switch was replaced with a switch that has a more defined detent. That is, it is more difficult to move the switch

from the detent. This will reduce the likelihood of future similar events but will not prevent them since the replacement switch is of the same design.

A placard has been affixed adjacent to the Unit 2 RPS power select control switch on the control panel which provides a warning concerning the sensitive nature of the switch and the need to exercise extreme caution when manipulating the switch. The Unit 1 switch is of the same design and, thus, a similar placard has been affixed adjacent to it.

A design change is currently under consideration to replace the Unit 1 and 2 switches with those of a different design.

ADDITIONAL INFORMATION

No systems other than those previously identified in this report were affected by this event.

No similar events have occurred in the past two years in which overtravel of a switch resulted in an automatic engineered safety features actuation.

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Georgia Power Company
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Telephone 205 877-7279

J. T. Beckham, Jr. Georgia Power
Vice President - Nuclear the southern electric
system
Hatch Project

September 23, 1994

Docket No. 50-366 HL-4697

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant - Unit 2
Licensee Event Report
RPS Control Switch Overtravel Results

In An Automatic Reactor Shutdown

Gentlemen:

In accordance with the requirements of 10 CFR 50.73 (a)(2)(iv), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning overtravel of a reactor protection system power supply select switch which resulted in unplanned actuations of several engineered safety features. This event occurred at Plant Hatch Unit 2.

Sincerely,

J. T. Beckham, Jr.

OCV/et

Enclosure: LER 50-366/1994-007

cc: Georgia Power Company
Mr. H. L. Sumner, General Manager - Nuclear Plant
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebneter, Regional Administrator
Mr. B. L. Holbrook, Senior Resident Inspector - Hatch

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